WHAT IS CLAIMED IS:

1. An iterative method for reducing interference in a desired signal in a GSM communication system using an alternate linear output filter, the method comprising:

inputting a burst of data of a received waveform including interference from a channel of the communication system;

training the alternate linear output filter with a set of symbols of specific quadrature phase, known a priori, in the burst of data of the received waveform;

operating on the received waveform with the alternate linear output filter to alternately linearly equalize the burst of data to provide an estimate of the desired signal;

generating log likelihood ratio estimates for a plurality of bits corresponding to the burst of data;

selecting a predetermined number of bits from the plurality of bits based upon a predetermined condition of the generated log likelihood ratio estimates associated with the plurality of bits;

augmenting the set of symbols of specific quadrature phase with the selected predetermined number of bits;

further re-training the alternate linear output filter with the augmented set of symbols; and

further re-operating on the received waveform with the alternate linear output filter to alternately linearly equalize the burst of data to provide an improved estimate of the desired signal.

2. The method of claim 1, wherein the set of symbols of specific quadrature phase used for training the alternate linear output filter as a training sequence include at least one of:

midamble symbols of the burst of data;

a set of leading zeros of the burst of data; and

a set of ending zeroes of the burst of data.

3 The method of claim 1, wherein the predetermined condition of the generated log likelihood ratio estimates for selecting the predetermined number of bits is based upon at least one of:

magnitudes of largest generated log likelihood ratio estimates of the plurality of bits;

magnitudes of largest generated log likelihood ratio estimates of the plurality of bits exceeding a threshold magnitude; and

magnitudes of generated log likelihood ratio estimates of the plurality of bits exceeding a threshold magnitude.

4. The method of claim 3,

wherein the burst of data is GMSK modulated, and

wherein alternating non-zero real and imaginary components of the midamble symbols of the burst of data are extracted by training the alternate linear output filter.

5. The method of claim 4, wherein training the alternate linear output filter includes minimizing the sum-squared error between a linear real estimate of the real and imaginary components of the training sequence of the alternate linear output filter and the received waveform.

6. The method of claim 1, wherein operating on the received waveform with the alternate linear output filter includes multiplexing the real and imaginary components of the received waveform upon entry into the alternate linear output filter in vector fashion.

7. An iterative method for reducing interference in a desired signal in a GSM communication system using an alternate linear output filter, the method comprising:

inputting a burst of data of a received GMSK waveform including interference from a channel of the GSM communication system;

training the alternate linear output filter with a set of alternating non-zero real and imaginary components of a training sequence, known a priori, in the burst of data of the received GMSK waveform;

operating on the received GMSK waveform with the alternate linear output filter to alternately linearly equalize the burst of data of the received GMSK waveform to provide an estimate of the desired signal;

generating log likelihood ratio estimates for a plurality of bits corresponding to the burst of data of the received GMSK waveform;

selecting a predetermined number of bits from the plurality of bits based upon a predetermined condition of the generated log likelihood ratio estimates associated with the plurality of bits;

augmenting the set of alternating non-zero real and imaginary components of midamble symbols with the selected predetermined number of bits;

further re-training the alternate linear output filter with the augmented set of alternating non-zero real and imaginary components; and

further re-operating on the received GMSK waveform with the alternate linear output filter to alternately linearly equalize the burst of data of the received GMSK waveform to provide an improved estimate of the desired signal.

8. The method of claim 7, wherein the training sequence includes at least one of:

midamble symbols of the burst of data;

a set of leading zeros of the burst of data; and

a set of ending zeroes of the burst of data.

9. The method of claim 8, wherein the predetermined condition of the generated log likelihood ratio estimates for selecting the predetermined number of bits is based upon at least one of:

magnitudes of largest generated log likelihood ratio estimates of the plurality of bits;

magnitudes of largest generated log likelihood ratio estimates of the plurality of bits exceeding a threshold magnitude; and

magnitudes of generated log likelihood ratio estimates of the plurality of bits exceeding a threshold magnitude.

10. The method of claim 9, wherein training the alternate linear output filter includes minimizing the sum-squared error between a linear real estimate of the real and imaginary non-zero components of the training sequence of the alternate linear output filter and the received GMSK waveform.

11. The method of claim 7, wherein operating on the received GMSK waveform with the alternate linear output filter includes multiplexing the non-zero real and imaginary components of the received GMSK waveform upon entry into the alternate linear output filter in vector fashion.

12. A receiver with an alternate linear output equalizer for reducing interference in a desired signal in a GSM communication system, the receiver comprising:

an analog-to-digital converter configured to convert an input signal that includes the desired signal and an interference signal to a digital waveform;

a burst synchronizer coupled to the analog-to-digital converter, the burst synchronizer configured to receive the digital waveform and to determine a synchronization delay between the desired signal and the interference signal;

a matrix kernel constructor coupled to the analog-to-digital converter and the burst synchronizer, the kernel constructor configured to receive the digital waveform, the delay, and a real set of a training sequence derived from the digital waveform to construct an autocorrelation matrix and a cross-correlation vector;

a filter parameter calculator coupled to the kernel constructor, the filter parameter calculator configured to receive the autocorrelation matrix and the cross-correlation vector to define linear tap estimates;

an alternate linear output filter coupled to the filter parameter calculator and the analog-to-digital converter, the alternate linear output filter configured to receive the linear tap estimates to operate on the digital waveform and output alternating real only and imaginary only symbols to provide an estimate of the desired signal;

a log likelihood ratio generator coupled to the alternate linear output filter, the log likelihood ratio generator configured to generate log likelihood ratio estimates for a plurality bits of the digital waveform; and

a bit selector coupled to the log likelihood ratio generator and to the matrix kernel constructor, the bit selector configured to select a predetermined number bits from the plurality of bits based upon a predetermined condition of the generated log likelihood ratio estimates associated with the plurality of bits, the bit selector further configured to provide the selected predetermined

number of bits to the matrix kernel constructor to augment the observation matrix and the training sequence.

13. The receiver of claim 12, further comprising:

an output selector coupled to an output of the alternate linear output filter, the output selector configured to direct the output alternating real only and imaginary only symbols from the alternate linear output filter to one of the log likelihood ratio generator and an equalizer; and

a noise power estimator coupled to the log likelihood ratio generator, the noise power estimator configured to provide an estimated noise power of the input signal.

14. The method of claim 13, wherein the training sequence includes at least one of:

midamble symbols of the burst of data;

a set of leading zeros of the burst of data; and

a set of ending zeroes of the burst of data.

15. The method of claim 14, wherein the predetermined condition of the generated log likelihood ratio estimates for selecting the predetermined number of bits is based upon at least one of:

magnitudes of largest generated log likelihood ratio estimates of the plurality of bits;

magnitudes of largest generated log likelihood ratio estimates of the plurality of bits exceeding a threshold magnitude; and

magnitudes of generated log likelihood ratio estimates of the plurality of bits exceeding a threshold magnitude.

16. The receiver of claim 15, wherein the burst of data is GMSK modulated.

17. The receiver of claim 16, wherein the filter parameter calculator minimizes the sum-squared error between a linear real estimate of the real only and imaginary only symbols of the training sequence of the alternate linear output filter and the digital waveform.

18. The receiver of claim 15, wherein the alternate linear output filter multiplexes the real and imaginary components of the digital waveform upon entry thereto.